North Dakota GIS Program Report
To Governor Jack Dalrymple

July 1, 2011 – June 30, 2012

Executive Order 2001-06: "The committee shall issue a report to the Governor's office at the end of each fiscal year, detailing progress, and problems encountered with GIS development in the state."

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Executive Summary

The North Dakota Geographic Information System (GIS) Program continued to be successful during the July 1, 2011 – June 30, 2012 reporting period. The Information Technology Department (ITD) and the North Dakota GIS Technical Committee (GISTC) operate the GIS Hub, an infrastructure comprised of geospatial data storage, data services, and application interfaces. The GIS Hub supports state agencies in the development of their GIS and the dissemination of common interest data to other levels of government and the public.

The GISTC actively enhances the GIS Hub by adding new data and maintaining existing data such as high-resolution elevation data, aerial photography, and school districts. The GIS Hub also supports web-based applications that are available via a PC or a mobile device. An example is the GIS Hub Explorer that allows one to view and browse state agency GIS data.

During the 2011-2012 reporting period there were over 3.1 million hits on the web services. There are more than 220 database layers and other GIS datasets on the GIS Hub which consume about 11.5 terabytes of storage or the equivalent of over 2,447 DVDs

Looking to the future, challenges include the careful consideration and potential adoption of cloud and mobile technologies.

GIS Program Governance

The GIS Technical Committee (GISTC) was established by Executive Order 1995-05 and re-affirmed by 2001-06. The primary role of the GISTC is to service the GIS Hub and provide a collaborative environment that supports state agencies' GIS. A secondary role is to coordinate among federal, state, tribal, local government and the private sector.

Seven agencies listed in the Executive Order:

- Department of Health
- Department of Transportation
- Game & Fish Department
- Geological Survey
- Information Technology Department
- Parks & Recreation Department
- State Water Commission

Associate Members:

- Land Department
- Oil & Gas Division
- Public Service Commission
- Department of Emergency Services
- Department of Agriculture (added May 2012)

Accomplishments

Data Services and Applications

GIS Hub data are streamed via web-based data services, making these data available to users inside and outside of state government. These data services can be used by people using GIS on a PC or mobile device.

An example of GIS Hub data available using a web-based data service is the high-resolution elevation data in the Red River Basin (Figure 1). This data is used primarily for flood fighting and mitigation, protecting infrastructure, and land use.

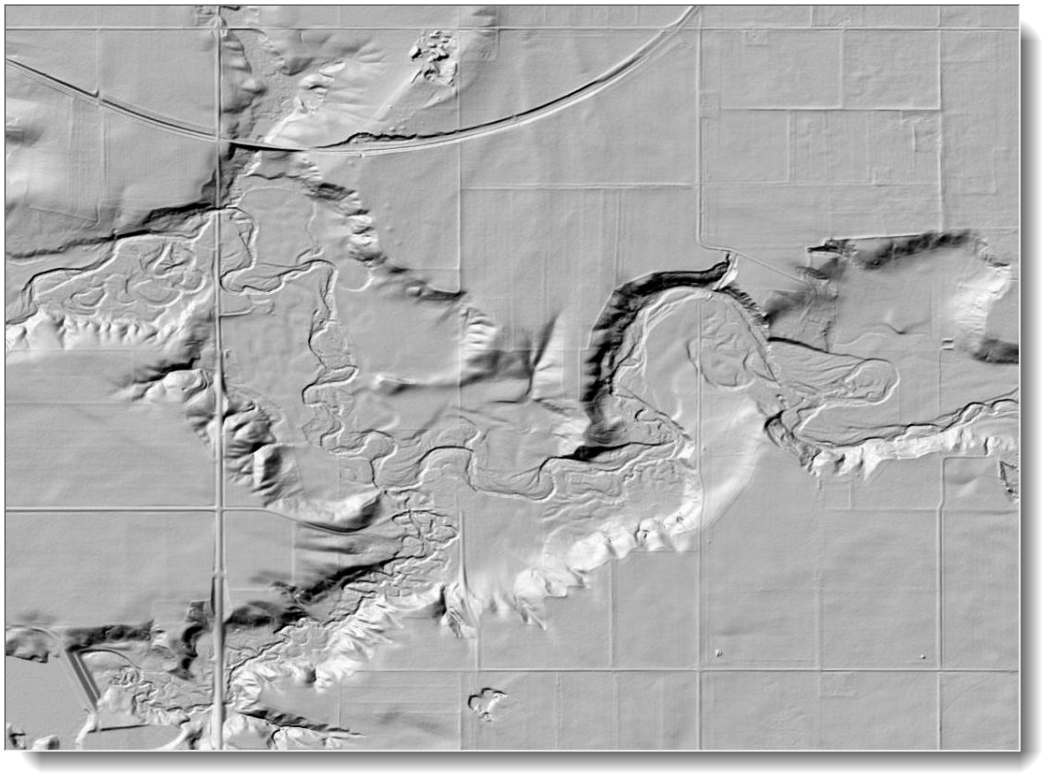

Figure 1. High-resolution elevation data in the Red River Basin.

Two examples of GIS applications are the GIS Hub Explorer and the Missouri River Flooding. The GIS Hub Explorer (Figure 2) is an all-encompassing tool used to view and query GIS Hub data. The Missouri River Flooding application (Figure 3) provides imagery before, during, and after the 2011 flooding.

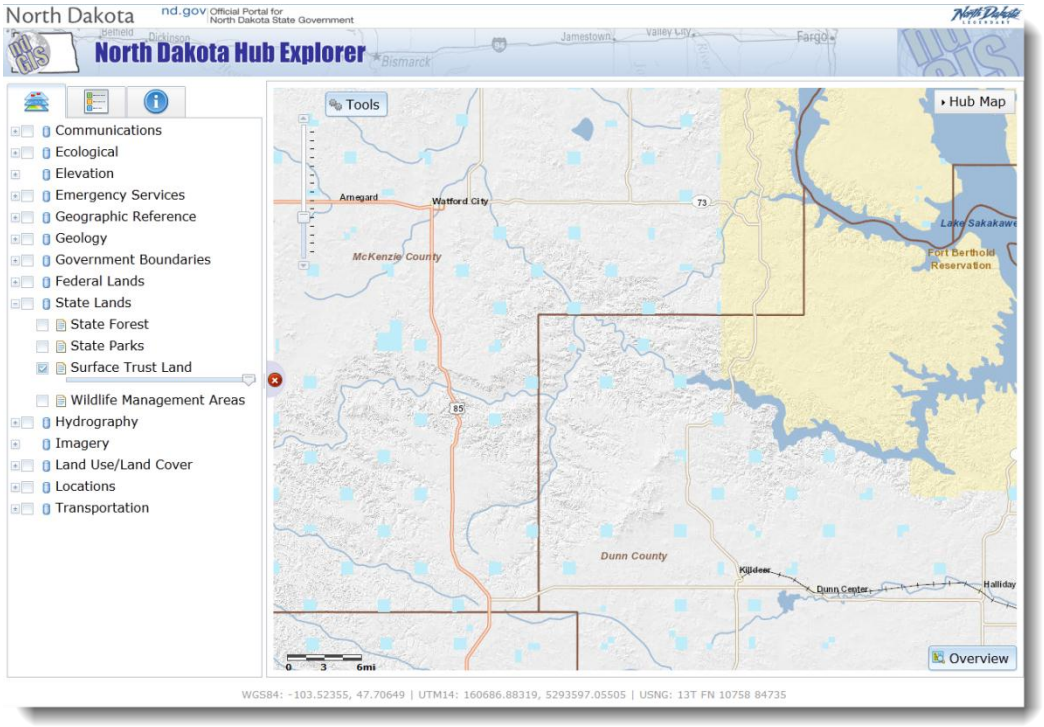

Figure 2. GIS Hub Explorer application showing base map data and surface trust lands.

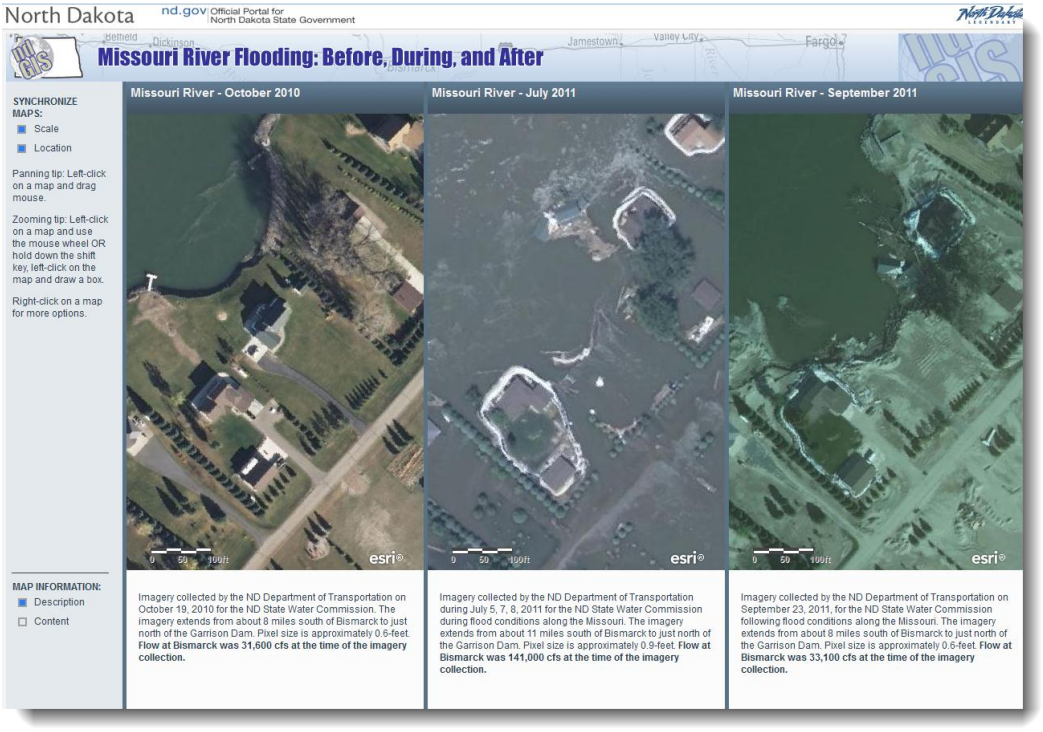

Figure 3. Missouri River flooding application showing the Hoge Island area.

Updated Data

- State agency data stewards updated/added the following data sets
    - Water data sites
    - Watershed boundaries
    - Wellhead Protection Areas
    - Ambulance and Quick Response Units
    - State lands
    - Federal lands
    - City boundaries
    - Road data from the NDDOT and the Census Bureau
    - School districts
    - K-12 school locations
    - Landuse/Landcover
    - Federal Communications Commission data
    - City of Fargo aerial photography
    - Cass County aerial photography

Training and Education

- **Users Conference** – Over 170 people attended the 2011 North Dakota GIS Users Conference which was held at the Alerus Center in Grand Forks.
- **Workshops** – The GISTC helps to organize seminars and workshops which range from overview topics to detailed subject. The subject of the most recent workshop was Mobile GIS, geared towards state agency leadership.
- **Coordinated GIS training** – The GISTC organizes training as needed to cover a wide variety of GIS subjects. This training has saved state agencies over $70,000 in training costs alone and over an estimated $290,000 in combined training and travel costs since the beginning of this program in 2002. These classes will continue in 2012 via instructors teaching through the web and using software and data installed in the Cloud.

Infrastructure

- In the 2009 report it was noted that the GIS Hub infrastructure was reconfigured by adding failover and redundancy to the database portion. The 2010 report indicated further work was required. A new storage system has been implemented that includes enhanced backup and disaster recovery. The majority of the GIS Hub servers are now virtual servers which allow optimal use of computing power such as increased capacity during flood operations.

Other Activities

- The Department of Emergency Services (DES) "Base Map Project" will result in aerial photography, road centerlines, and address points, all of which will be used in emergency operations, management, and planning. The DOT is collecting high-resolution aerial and is digitizing road centerlines from the aerial photography. DES has contracted with a

vendor to add address information to the road centerlines and to develop the address point data. This data set will reside on the GIS Hub and will be publicly distributed (minus confidential information). Figure 4 shows an example of the photography which is already on the GIS Hub.

Figure 4. Department of Emergency Services base map project aerial photography.

- The GISTC and the GIS Hub are supporting state agency activities that are related to the oil and gas boom. An example of this is the development of the Crew Camp Location Project. The IT Professional Services Contract Pool will be used to select a GIS vendor to collect the varied datasets and information from state agencies and use that data as the basis for a spatial dataset depicting the locations of crew camps and the associated information. This data will be available from the GIS Hub.

Challenges

- **Storage** – The growth in GIS data storage needs will continue to grow due to normal data development and for emergency response data needs such as for flooding. The cost of increased and current storage needs have been met by an increase in the 2011-2013 GIS budget. Future storage costs will likely continue to climb and will eventually drive the need to further increase the GIS budget, archive less-used data, avoid acquiring some data, or some combination.
- **Cloud –** GIS applications, services, and data have been in the "cloud" for several years. Cloud-hosted GIS comes with many benefits that need to be balanced with security, access, and cost. Cloud GIS is becoming more clearly defined as defined by three examples:
  - The Western States Contracting Alliance (WSCA), of which North Dakota is a member, has facilitated an RFP for GIS cloud-based hosting and storage

- GIS software such as that from Esri is available on Amazon servers.
- Esri, North Dakota's primary GIS software vendor, has expanded their existing "ArcGIS Online" to include a subscription model.

- **Mobile applications** – Mobile devices such as tablets and smart phones will continue to drive the demand for the state to provide services to those devices. GIS is on the forefront of this need. Though there is more to do, progress has been made. The GIS Hub infrastructure allows relatively simple viewing and editing applications to be easily set up. The GIS Hub data and the GIS Hub Explorer are now available via mobile devices. Figure 5 shows an image of the Hub Explorer Mobile version.

Figure 5. The Hub Explorer Mobile version showing Wildlife Management areas and surface trust lands.